

African agricultural tools: implications of synchronic ethnography for agrarian history

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Abstract

Although the last few years have seen considerable advances in African archaeobotany and a broader picture of the evolution of African agriculture from the point of view of crop remains is now available, our understanding of the techniques of that agriculture remains poor. Although Africa has a rich diversity of agricultural tools, these are known principally from synchronic descriptions rather than excavation. Material culture studies, at least from the point of view of classification and distribution are largely discouraged and it is no accident that the only monograph on this subject was written in German by Baumann in 1944 and remains little-known. Despite this, the majority of African farmers still use traditional tools, and have them repaired by village blacksmiths. From this, it is possible to recover evidence for their names, construction and use. This paper attempts a preliminary survey of the tools in use, their classification and the hypotheses that can be suggested concerning their evolution and development.

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1. Introduction

1.1 Reconstructing the prehistory of African agricultural implements

Although the last few years have seen considerable advances in African archaeobotany, so that we now have a broader picture of the evolution of African agriculture from the point of view of crops, our understanding of the techniques of that agriculture remains poor. Although Africa has a rich diversity of agricultural tools, these are known principally from synchronic descriptions rather than excavation. Material culture studies, at least from the point of view of classification and distribution, are largely discouraged and it is no accident that the only monograph on this subject was written in German during the Second World War and remains little-known (Baumann 1944).

A certain urgency is suggested by the rapid erosion of traditional tool production and use. Animal traction and tractors are replacing hand-tools in some areas, but probably more significant is the replacement of implements made locally by blacksmiths with standardised factory-made tools. This can follow from aid projects but is also often a consequence of social disruption and war. Once NGOs and international agencies get into the business of resupplying communities following civil society they do not often enquire closely into traditional implements but supply those easily available from industrial sources.

Beyond this, there is also a noticeable difference between the ethnographic tools illustrated in early monographs or taken from nineteenth and early twentieth century collections and those in use today, even if they have been made by 'traditional' blacksmiths. The growth of the nation-state, with improved long-distance trade, agricultural schools and development projects have tended to make the tools more uniform over much greater areas. The availability of scrap iron and improved blacksmithing techniques has made possible greater specialisation and economies of scale and this is affecting tool repertoires.

Despite this, the majority of African farmers probably still use some traditional tools, and have them repaired by village blacksmiths. From this, it is possible to recover evidence for their names, construction and use. However, this has remained a poorly exploited source of data for archaeologists and prehistorians. This paper¹ attempts a preliminary survey of the tools in use, their classification and the hypotheses that can be suggested concerning their evolution and development. The paper omits Madagascar and the Indian Ocean islands as these have a whole range of tools quite distinct from the mainland, thereby further lengthening the discussion.

In assessing whether African tools are essentially indigenous or have spread from outside the region, it is useful to have comprehensive comparative materials. Unfortunately, these are hard to access. Roman implements been well covered in White (1967, 1975) and Stuhlmann (1912) is a valuable guide to the Maghreb, but many questions posed by speculations in this paper have no immediate answers.

1.2 Terminological issues

A perplexing problem in describing agricultural tools is that many African types have no standardised name. French scholars, who have been more active in this area, have devised a number of terms, often by re-excavating old rural names, but these have yet to be adapted into English. Wigboldus (2000) attempting to describe the wooden spade-like tool used in the Sahel, proposed the term 'long-handed scuffle' but later admitted defeat and returned to *iler*, a regional term. Nonetheless, this seems unsatisfactory and the paper

¹ This paper was first formally presented by Dorian Fuller for me at the IWAA meeting in London in July 2006 and I am grateful to him for this opportunity. I subsequently had a chance to present it informally in Calgary at the SAFA meeting in Calgary on 25th June 2006. My thanks to the audience for their comments and particularly to Nic David for useful additional ideas. It was at Calgary that the team under Manfred Eggert presented the important finds of iron tools in Southern Cameroun and I am grateful for permission to illustrate some of these in this paper.

will make some further efforts to adapt or introduce descriptive terms for African tools. Not all of these proposals seem successful and further suggestions for names are welcome.

1.3 Three phases of the availability of iron

Although agricultural tools can clearly also be made of stone and wood, there is little doubt that African agriculture was transformed by the production of iron and that this led to a major diversification of tool morphology. Unlike the Mediterranean world, although copper was widely smelted in Africa contemporaneously with iron, it seems never to have been used for tools and only occasionally for weapons (Cornevin 1993). The only exception to this is in the subdesertic regions, especially Mauretania, where a widespread industry existed from ca. 4000 BP, using both native copper and later copper alloys. Lambert (1983:79-80) illustrates a number of copper implements (with arsenic) she describes as *haches*. The illustrations are not clear enough to be sure, but some of the triangular blades with truncated tops could be hoe blades. The method of fixing these blades to a handle is uncertain. The great majority of tools in these Mauritanian finds are weapons, arrow and spear tips, so if there was an excursion from copper into agricultural tools it made little broader impact on sub-Saharan Africa.

Iron became available in three significantly different phases and this has had a differential impact on the types and numbers of tools created by blacksmiths. These phases can be delineated as follows;

- a. Initial introduction of iron smelting
- b. Import of pig-iron from the sixteenth century onwards
- c. Availability of scrap iron from discarded industrial products

Table 1 shows these three phases, their approximate dates, and the implications for iron availability;

Table 1. Phases of iron availability in Africa		
Phase	Date	Scale
I	ca. 2500 BP	small
II	1500 onwards	medium
III	ca. 1950 onwards	large

Needless to say, the spread of iron was geographically determined and the more remote an area, the longer it took for the effect of cheaper iron to percolate through. For example, iron began to be traded from the coast in the sixteenth century, but it was not until the 1930s that the competition with locally-smelted iron was so significant as to cause smelting industries to erode and eventually disappear. Hence it was possible for many archaeologists in the 60s and 70s to commission smelts in order to study traditional founding processes. This process of elimination is virtually complete, but in an extremely remote area in SW Ethiopia, smelting still competes with imported scrap, because the nearest road is still a week away on horseback (Haaland 200x).

A fourth phase could also be suggested, the purchase of finished iron products from European industries. It seems that the first product of this type to be imported was the cutlass or *panga* (§3.3.2). Other imported iron products were the plough-share, the harrow and in more recent times, spades, shovels, rakes and various types of hoe-blade. The impact of these has been highly variable according to how useful farmers perceive them to be. Another surprising feature of imports is that they have been much more influential in eastern and southern Africa than in West Africa.

The cost of iron is also probably related to the designs of hoes. Where iron is expensive, the design may trade off the stability of the hoe with the amount of iron used. Gripped and bound hoes (§3.2.4 and §3.2.2) generally use less iron than socketed hoes (§3.2.5) but are less suitable for heavy work as they are more unstable. Once iron becomes cheaper, unstable designs tend to disappear. It is for this reason that unstable

designs seem to show limited morphological and geographical unity, as they are constantly being adopted and dropped and then reinvented.

1.4 Morphological boundaries between tools are not sharply defined

An old joke has it that for a DIY enthusiast, any object to hand can be a hammer. The definition of African tools can also be rather fluid, as almost anything can be developed into an hoe or earth-shaping tool. Dupré (2000) illustrates this with the agricultural knife of the Congo (§3.3.2), which at one extreme resembles the bush-cutting knife, but in some examples, develops a wide blade and becomes equally used for planting and uprooting. She calls this an *outil polyvalent*, which seems appropriate. Similarly with digging sticks; those on the edge of the Sahara have gradually developed extra wide blades and now often resemble long-handled hoes. For this reason, it is always helpful to investigate tools in use, rather than assume their function can be deduced from their morphology.

2. Types of evidence

2.1 Ethnographic evidence

The use of material culture from the recent past is still a store of information largely unexploited by archaeologists. It is sometimes thought that ethnoarchaeology covers this, but in fact, the emphasis on pottery and house-forms has been pursued to the near-exclusion of all other types of evidence (Blench in press). Indeed, the mapping of existing African agricultural tools and their associated terminology is still in its infancy. There are, however, a variety of ethnological descriptions and overviews which would form useful background material for this enterprise. The German ethnologists took considerable interest in this topic and Baumann (1944) published a very detailed description of the morphology and distribution of African farmers' tools. Two edited volumes in French provide rich material as yet unmined by archaeologists (Seignobos 1984; Seignobos et al. 2000). This material has the classic problem of Francophone publications, their tendency to halt at linguistic boundaries. Papers use 'Northern Cameroun' as a unit of analysis, even though there is no evidence that this is relevant to the tools under discussion. Nonetheless, Anglophone scholars have been very remiss in this area; data must be retrieved from the inclusive monographs of the early twentieth century as it is commonly missing in more recent, 'theoretically sophisticated' studies.

Like so much in the field of material culture, documentation is urgently required, as there is a significant process of homogenisation at work, even where blacksmiths are still making tools. Descriptions of tools are scattered in hard-to-obtain monographs, such as Coulibaly (1978) for the Senufo in Cote d'Ivoire or Mudindaambi (1976) for the Mbala in DRC. Seignobos (2000) documents this process in Northern Cameroun, where a relatively few tool types are becoming dominant and the variety that he illustrates is gradually disappearing. Throughout the continent, factory-made tools and tractors are replacing traditional cultivation techniques.

2.2 Archaeological and iconographic evidence

2.2.1 Iron, wood and stone

A striking feature of African agricultural tools is the comparative rarity of pre-existing models in other materials. Although agriculture clearly preceded iron, we have only a sketchy idea of what tools were in use prior to the introduction of iron. It is possible to make a wooden hoe blade for use in light, sandy soils but

whether wooden hoes preceded iron ones is doubtful². Although stone sickles for cutting grass existed as far back as 12,000 BP in West Africa (Shaw & Daniels 1984) these were not the precursors of the iron sickle of the present Sahel, which is a late trans-Saharan introduction. But it seems doubtful that many of the techniques characteristic of African agriculture could be pursued without iron tools, for example, the raising of large furrows and yam mounds.

A case where it is possible to see something of this limited pre-iron repertoire is Fernando Po. This island was settled by a Stone Age Bantu group, the Bubi, some 3-4000 years ago. Although the Gabonese Fang people reached the island prior to European contact (supposedly 800 years ago) they brought very limited iron, with the result that most Bubi were still using lithic technology when Europeans first made contact. This was still recoverable when Tessmann (1922) the first major ethnographer of the island began his studies and illustrates how difficult agriculture must have been. **Figure 1** and **Figure 8** show some of the tools he recorded during his visit.

The failure of the plough to spread across the Sahara had interesting consequences for the evolution of African tools. Ploughs were introduced in North Africa before the spread of iron in sub-Saharan Africa. As a result, they replaced pre-existing hand tools across the Maghreb to a considerable extent, which in turn meant that these did not spread across the Sahara, which is why so many sub-Saharan tools are *sui generis*. North African hand hoes are largely of the type where a straight cylindrical handle is pushed through a ring of iron fixed to the blade of the hoe, a construction technique found across the Maghreb and down the Nile as far as Sennar, but nowhere in sub-Saharan Africa. Recent industrial hoes are of this type and can be seen in recent descriptions of 'African tools' (e.g. FIDA 1999) but are never illustrated in older ethnographic texts.

2.2.2 The early rarity of iron and its re-use

Iron produced by smelting is a lengthy process and particularly when smelting was first introduced, iron was presumably extremely rare and costly. One of the consequences of this was that iron was constantly re-used. Hoe blades would have been forged over and over again and when the blade became too fragile the pieces would have been made into ornaments and other items unrelated to tools. As a consequence, remnants of agricultural tools are rarely found in early sites, even where furnace remains show that iron must have been produced in quantity. As skills developed, iron production was gradually on a larger and larger scale, leading to sites where it can be described as sub-industrial. One of the more well-known sites is Meroe in Upper Egypt (Cornevin 1993:141). The furnaces are of the Roman type and are now thought to date from the first and second centuries AD, but do represent iron production on a large scale. Somewhat later is the Igbo site of Leja, which although it has dates as early as 200 cal BC, probably began high volume production in the 15th and 16th centuries where most dates are clustered (Okafor 1993:438). Sukur, in the Mandara mountains of Northern Cameroun probably became a major producer in the 17th century (David 1996:598). Nonetheless, until the immediate

Photo 1. 'Marriage' hoe from the Mandara mountains



Author's collection

² I once saw, in a Dakar antique shop, a beautiful wooden hoe that had clearly been used. I could not afford to buy it and have never seen anything similar, in museums or illustrated.

pre-colonial period, iron remained a rarity in many remote societies, and thus it remains difficult to trace the history of tools from archaeology.

2.2.3 Iron as money and in ritual exchanges

The value of iron in the era of smelting and its use in agriculture soon became related to its use in currency systems. Although there is some evidence for the use of copper in trade, notably the Katanga crosses, iron was probably more important as a local currency. The most well-known example of this is the ‘Kissi penny’ or *guinzé*, a long, thin strip of iron with a flattened end used in exchanges in a zone between the Liberian coast and Southern Guinea at the end of the 19th century (Béavogui 2000). The exact antiquity of this device is hard to gauge, as it probably reflects the abundance of iron following post-European imports. Hoe blades were frequently used in currency-like contexts, such as brideprice payments, throughout much of West Africa. However, as the culture of ritual exchange developed (and as the total amount of iron in circulation gradually increased) ritual blades became morphologically transformed until they were no longer useful as hoes, but only functioned within the context of exchange. The Mandara mountains in Northern Cameroun are particularly notable for the wide range of hoe-like objects manufactured and circulated. Seignobos (2000) illustrates a number of these *fers de dot*, and more types exist on the Jos Plateau and other regions west of the Mandaras.

2.2.4 Hoe culture and the division of labour

Agricultural tools do not exist in a sociological vacuum; farm labour in Africa has always been strongly divided along gender lines and this is frequently reflected in the tools themselves. The discussion about the division of labour was taken up in detail by Baumann (1928) and later Goody (1976). Broadly speaking, men tend to do the ‘heavy lifting’, clearing the bush, raising large furrows and yam heaps while women tend kitchen gardens and carry out secondary tasks such as weeding. In early versions of this, hoe culture was connected to ‘matriarchy’ [matriliny in modern terms] but whether such correlations are useful can be debated. There are many variations on this, from some of the extreme societies in the Senegambian region where women carry out virtually all agricultural tasks, to societies where women are not allowed on the farm. The advent of a puritanical Islam has also had a significant transformation in parts of West Africa, as men increasingly take over all farming tasks considering that to expose women outdoors contravenes Islam. The consequence of this division is that many societies have ‘men’s’ and ‘women’s’ tools. The focus of this paper is on the gross morphology of tools, which often does not reflect this difference, but typically men’s hoes or axes have different shapes and weights and may be adapted to slightly different tasks.

2.3 Linguistic evidence

Despite the importance of African agricultural tools, historical linguists have so far ventured very few reconstructions. One database that can be exploited for evidence of the antiquity of agriculture is Bantu Lexical Reconstructions (BLR3) maintained by the Musée Royale de L’Afrique Centrale (MRAC).³ This database lists forms that have been reconstructed in different regions of the Bantu zone, stretching from Cameroun to South African and the Kenya coast. **Table 2** shows all the proto-forms in the database relating to agriculture as well as the zones where they occur.

³ BLR3, the third edition, is at <http://linguistics.africamuseum.be/BLR3.html>

Table 2. Bantu reconstructions indicating agriculture

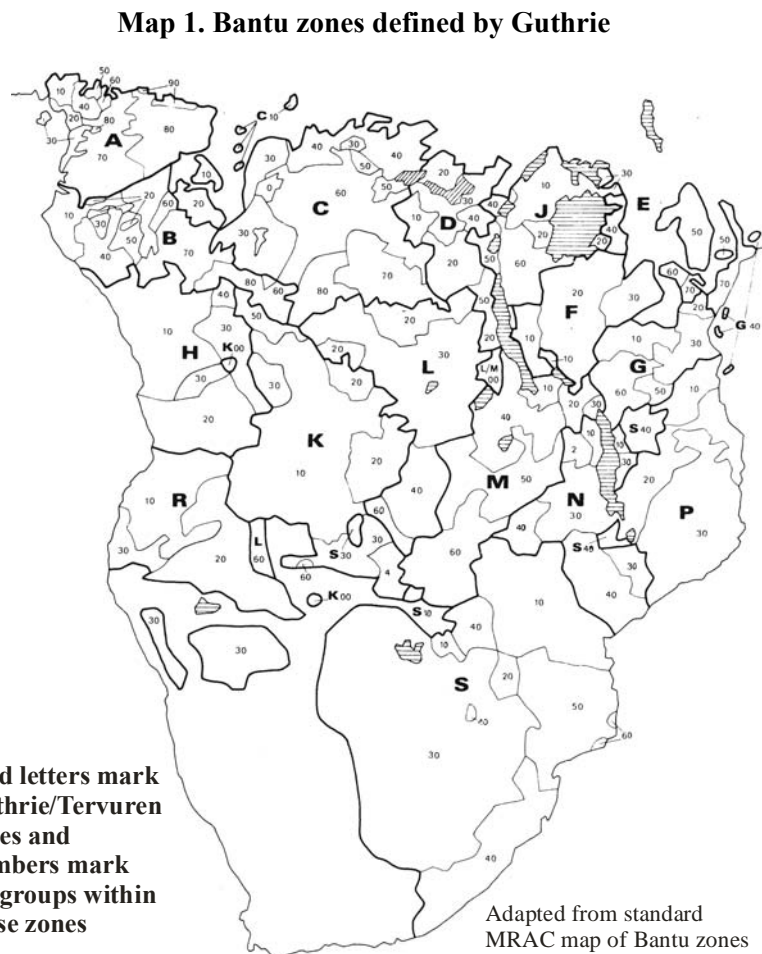
Root	Gloss	*form	Zones	Regions
I	hoe, axe	bàgò	A J P	NW NE SE
		bògà	A B	NW
II	hoe	cúkà	C F G J L M S	NW C NE SE
		kácù	D K L M	NC
		púkà	A J	NW, NC
III	cultivate (especially with hoe)	dìm	B C E F G J K L M N P R S	Throughout
	cultivated field	dìmì	J L M	NC
	field sp.	dìmìdò	J	NC
	cultivated field	dìma	J S	NC
	field sp.	dìmé	J L M	NC
	farmer	dìmi	J L	NC
	work	dìmò	C F G H J K L M N S	Throughout
IV	hoe; axe; spear-head; knife	gèmbè	C D E F G J M P	NW C NE SE
	shave; cut hair	gèmb	J	NC
	razor	gèmbè	D F J L	NE
	axe; hoe	dèmbè	S	
	axe; hoe	jèmbè	E G L M N S	

Source: BLR3

The complex of terms around farming and cultivation, attested in A and B groups close to the Bantu homeland, argues fairly convincingly that the proto-Bantu had some form of agriculture (see also Bostoen, Ehret this volume). There is an overlap of words for ‘hoe’, ‘axe’ and razor’, especially partway through the Bantu expansion (C group onwards). This probably corresponds to the period of the introduction of iron tools, some 2500 years ago. Initially, they would have been rare and expensive and there would have been a tendency to call them by the name of their material, leading to a polysemy that is uncommon in the present.

Map 1 shows the location of traditional Bantu zones used by BLR3 to define the distribution of cognate terms.

Bold letters mark Guthrie/Tervuren zones and numbers mark subgroups within those zones



Another important study is that by Tourneux (1984) of the names of agricultural implements in Northern Cameroun. Although the languages he considers are quite closely related, the vernacular terms are very diverse, making it difficult to extract useful historical information. Two lessons can be learnt from this; linguistic sources are often not very accurate in terms of descriptions of material culture and there is considerable jumping of terms from one implement to another.

3. Classification and distribution of African agricultural implements

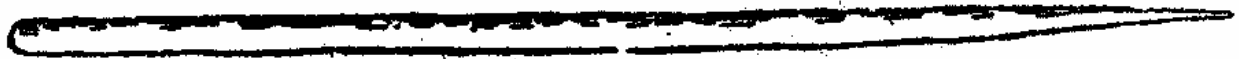
The following section represents a broad classification of African agricultural implements by morphology. Of necessity this links together implements that may not be historically connected, particularly in the case of wooden and bound hoes. However, it seems that most implements which are technologically similar are also related, although in many cases, distributional data is extremely poor.

3.1 Digging sticks and planters

3.1.1 Digging stick

The simplest tool still in use in agriculture is the digging stick. In its most rudimentary form, it is a stick with a pointed end, used for making holes in which seeds can be dropped. More complex sticks have iron tips and these can gradually widen and flatten out until they resemble long-handled hoes, used for more sophisticated earth manipulation. Some digging sticks still in use in the twentieth century had perforated stone weights on the top of the stick to increase the penetration of the pointed end. Such implements are recorded from Ethiopia (Gascon 1977). Such perforated ring-stones have been recorded from a number of archaeological sites in Africa. Digging-sticks are pre-agricultural, used by foragers to dig out yams for example. Vincent (1985) illustrates the example of the Hadza of Central Tanzania digging for tubers with sharp pointed sticks. However, the Hadza use decidedly modern cutlasses to sharpen the stick as they dig, so this cannot be a model for pre-Neolithic practice. The Bubi of Fernando Po, who were not ironic in pre-European times, still preserved an all-wooden digging-stick in the 1920s when Tessmann (1922) visited them (**Figure 1**).

Figure 1. Digging-stick from Fernando Po

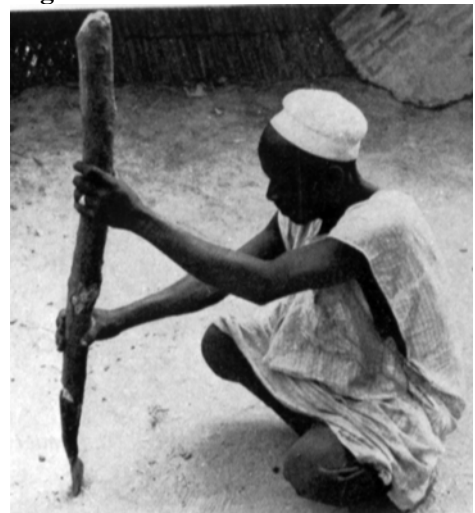


Source: Tessmann (1922)

3.1.2 Planter

Across the Sahel, pointed wooden sticks with iron tips are used as planters (Photo 2), especially in flood-retreat cultivation. This system is described for Senegal by Lericollais & Schmitz (1984:440). Wenté-Lukas (1977:92) illustrates planters from Northern Cameroun with angled handles like a walking cane.

Photo 2. Hausa planter in Maradi, Niger



Source: Raynaut (1984)

3.1.3 Arrowhead digging stick

A development of the digging stick is a long handle with an arrow-headed tip, used on the southern margins of the desert in West Africa (Photo 3). Some examples are entirely made of iron (Photo 4), which is presumably a recent development. They are suitable for turning soil in sandy environments. It seems most likely they are an introduction from the medieval period, although there is no direct evidence to support this.

Photo 3. Arrowhead digging sticks, Maradi



Source: Raynaut (1984)

Photo 4. Head of Tamashek digging stick, Mali



Source: Author's collection

3.2 Hoes

The most widespread and significant African agricultural implement is the hoe. A small number of African hoes have wooden blades and there is debatable evidence for copper blades in archaeological contexts in West Africa, but hoes with iron blades predominate. Iron-bladed hoes can be subcategorised according to the method of fixing the blade. The principal types are;

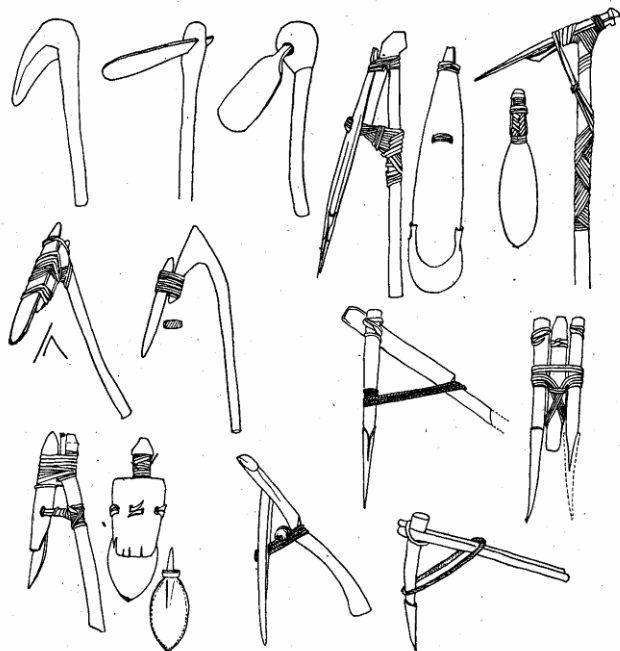
- a. bound hoes
- b. transpierced hoes
- c. gripped hoes
- d. socketed hoes

A fifth type of hoe, where a straight handle passes through a ring soldered to the top end of the hoe-blade is characteristic of most European hoe designs and is the common type imported into Africa. Such hoes have been recorded from Morocco and the Nile, but it is difficult to be sure about their provenance.

3.2.1 Wooden hoes

Baumann (1944:207) illustrates a number of wooden hoe types from across Africa (Figure 2) (see also Arkell 1937a). Baumann's map (p. 208) shows a strip across the continent from Senegambia to Southern

Figure 2. African hoes with wooden blades



Source: Baumann (1944:207)

Ethiopia. A wooden hoe will only function in soil that is relatively light and without too many stones. Otherwise the blade will break extremely quickly. Morphologically, there seems to be little unity between these implements and it is not unlikely that these are not precursors of the iron hoe but rather back-formations, copies in wood of iron implements. Some indeed have iron tips and may simply be designs to save on iron. Some also fall within the next category ‘bound hoes’ (§3.2.2).

3.2.2 Bound hoes

Earlier sources for African agricultural implements illustrate a wide variety of bound hoes (Fr. *houe à surliure*) (Baumann 1944; Seignobos 2000), where the blade is simply attached to the handle by a cord (Figure 3). Meek’s (1931, I) account of Mambila hoes makes this point;

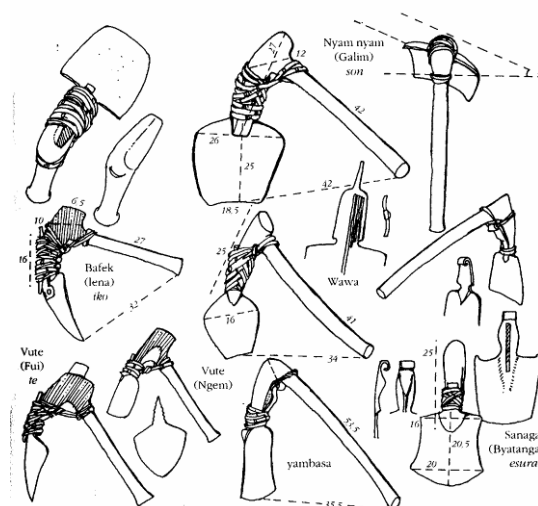
They had no hoes and carried out their operations by means of digging sticks. When they first obtained the iron hoe head they used it without affixing a handle. At the present time the hoe head is fixed to the iron handle by the primitive method of binding with palm-fibre.

Personal observation in the 1980s suggests that this type of hoe had been completely replaced by ‘modern’ hoes from Nigeria, where the tang transpierces the handle. Technically speaking, this method is highly inefficient as the impact of the hoe against the ground will loosen the binding very rapidly. Hence there will be a rapid trend to replace this type of hoe with less breakable models. The fact that so many survived into the ethnographic era underlines the point that iron was expensive until very recently and widespread access to iron hoes relatively new. As a result, transitional implements have still survived to be documented.

3.2.3 Transpierced hoes

I have adopted this rather ungainly term to describe hoes where a metal tang projects from the blade and passes through the wooden handle. This is probably the simplest method of fixing a metal blade, but seems to have no wooden analogue as the first blow against the earth would probably split the wood. Archaeological evidence for this type of hoe is quite abundant. Vogel (1973) describes such hoes from several sites in Zambia and notes that hoes of similar construction were still in use when these were excavated. **Figure 4** shows some hoe blades from Kumadzulo, a 6th century site in modern-day Zambia. Lancaster (1975) noted that similar hoes can be traded long distances in current ethnographic contexts.

Figure 3. Bound hoes from Northern Cameroun

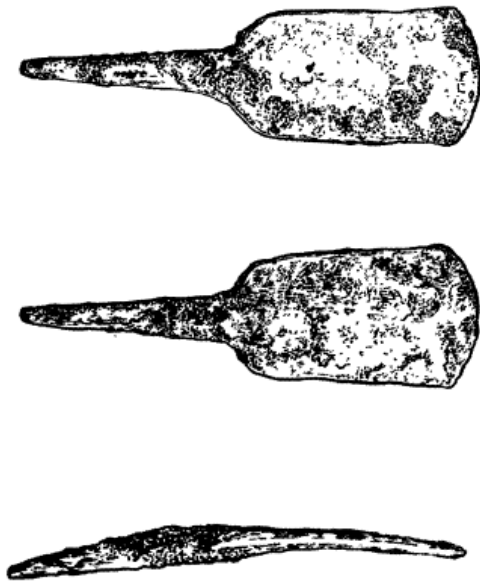


Source: Seignobos (2000)

Photo 5. Mounding hoe, Supyire, SE Mali

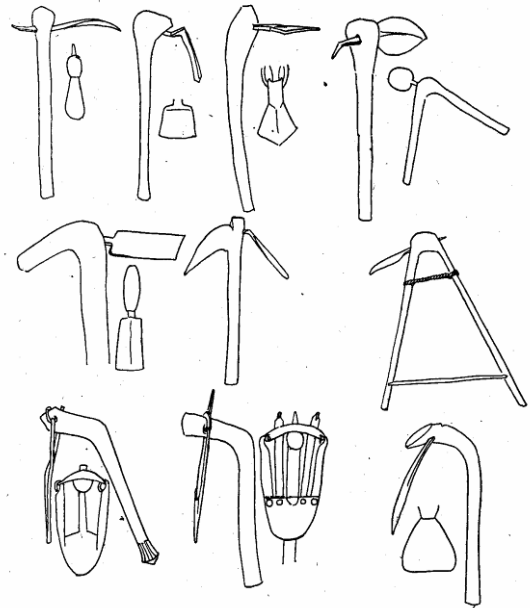


Figure 4. Hoe blades from Kumadzulo



Source: Vogel (1973)

Figure 5. African transpierced hoes

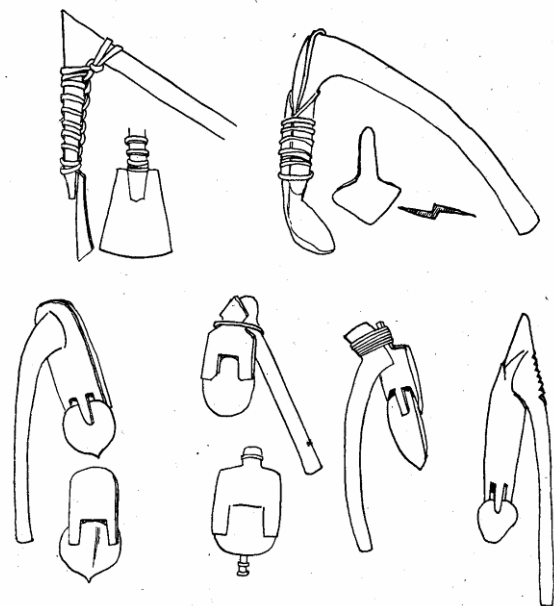


Source: Baumann (1944:217)

3.2.4 Gripped hoes

A type of hoe which is widespread, but like the bound hoe seems to have a highly diverse morphology, is the gripped hoe (Figure 6). Baumann (1944) illustrates a number of types spreading from Ghana to Chad and parts of the DRC. Seignobos (2000) also shows these are particularly diverse in Northern Cameroun. In some cases this can be combined with binding, but the principle is that the blade is gripped between wooden projections on the handle. The advantage of this construction method is that the hoe need only use a very small iron tip with most of the blade made of wood. The disadvantage is that the iron piece probably comes loose very regularly. Like the bound hoe, this may not represent a stable morphological type, but rather a transition to the transpierced and socketed types.

Figure 6. African gripped hoes



Source: Baumann (1944:225)

3.2.5 Socketed hoes

Another very characteristic type of African hoe, found almost throughout the continent, is the socketed hoe (Photo 6). Instead of piercing the handle with a tang, the blade is folded into a tube and usually fitted to a naturally bent handle. Socketed hoes use more iron than the other types but are probably more stable in use. Eggert et al. (2006: Fig. 4) illustrate a decorated hoe-blade from the site of Akonyete in Southern Cameroun dated to between 1815 and 1685 BP. They remark that the socketed design is unusual for Central Africa, but socketed hoes are common in West Africa. They also suggest that the thin blade may imply that it was manufactured for ritual purposes rather than everyday use. However, it may also simply reflect the scarcity of iron at this early date.

Photo 6. Socketed hoes, Burkina Faso



Source: FIDA (1999)

3.3 Knives, cutlasses

3.3.1 Knife

Knives appear to be very old in African culture and cane knives probably preceded iron types. Table 3 illustrates an archaic root for ‘knife’ in Niger-Congo languages which points to cognates between Benue-Congo and Kru, a node which must be 6-7000 years old at a minimum, i.e. well before the introduction of iron. There is no proof that such knives were only used for agriculture proper; it is likely that they would have been adapted to a wide variety of purposes. Excavations in Akonetye, Southern Cameroun have recovered the earliest iron knife so far recorded in sub-Saharan Africa (Eggert et al. 2006). Photo 7 shows an X-ray of this blade, which is dated to between 1815 and 1685 BP⁴. However, African knives quite closely resemble curved sickles (§3.5.1) and may have evolved in form as the sickle spread in West Africa (Photo 8). Wente-Lukas (1977:100) illustrates two types of *Erntemesser* (harvest-knife) used by the Bana people in Northern Cameroun, which are straight-bladed knives rather than true sickles.

Photo 7. X-ray of knife blade from Akonyete

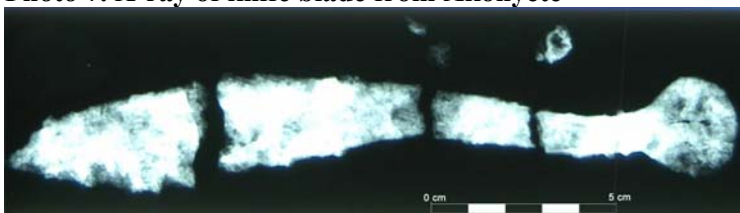


Photo 8. Dogon agricultural knife



⁴ I would like to acknowledge the Tübingen/Frankfurt team for this illustration

Table 3. An archaic root for ‘knife’ in Niger-Congo languages

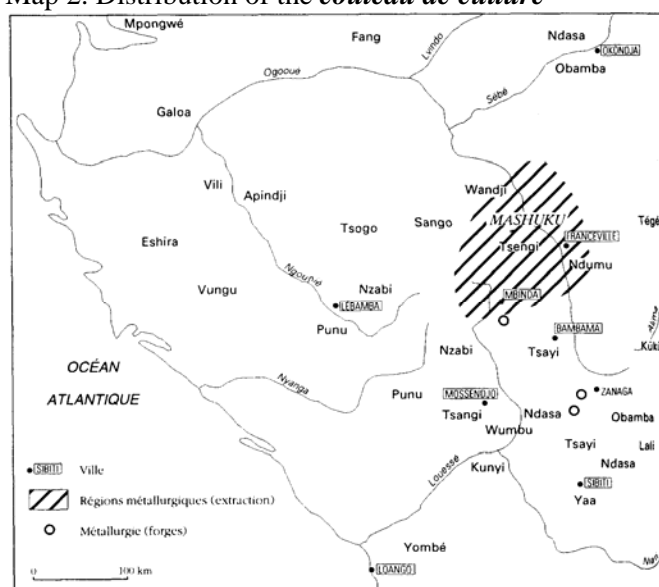
#-gbeN Group	knife Language	Attestation	Comment
Kru	Aizi	bē	
	Bete	gblè	
Yoruboid	Igala	obe	
Edoid	Bini	ábéè	
Igboïd	Ekpeye	ògè	? loan from Ogoni. Cf. Kana gǝ
Akpes	Daja	oyùṅgbà	
Nupoid	Nupe	ebì	
Oko	Magongo	igbegbē	
Idomoid	Idoma	àgbàgá	
Plateau	Tyap	abaai	
	Shall	nbaa	
	Jijili	obā	
Cross River	E. Ogbia	ò-gyè	pl. è-
Dakoid	Dõ	gbaa	
Mambiloid	Camba	bu	
	Somyev	bi	
	Len	mbètè	
Bantu	PEG	*-bé`	

3.3.2 Couteau de culture

An intriguing and little-known implement from West-Central Africa is the *couteau de culture* described by Dupré (2000). These are knives with either asymmetrical blades adapted for cutting or symmetrical, leaf-shaped blades also used in planting operations and approaching a trowel (§3.6.2). Some of the variety of these knives is illustrated in Figure 7.

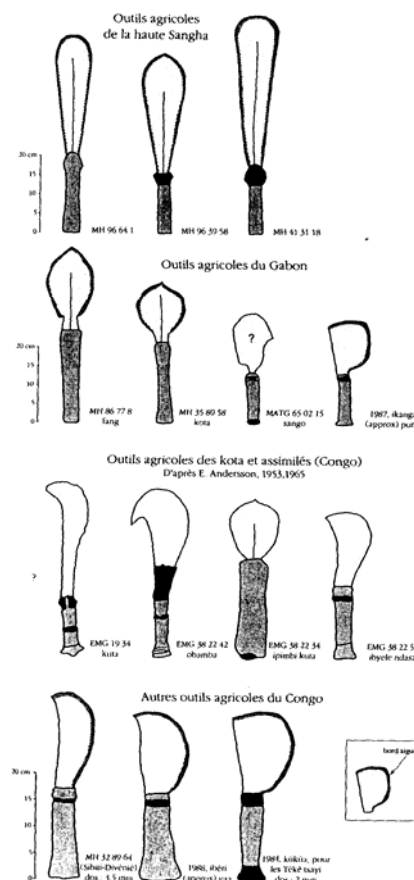
The distribution of cultivating knives is given in Map 2, although to judge by an illustration in Seignobos (2000: Fig.6) these knives are

Map 2. Distribution of the *couteau de culture*



Source: Dupré (2000)

Figure 7. Cultivating knives from Central Africa



Source: Dupré (2000)

found as far north as the Cameroun Grassfields, as one illustration is attributed to a 'Bamileke' origin.

3.3.2 Cutlass

The African cutlass, machet or panga is essentially a large knife, used for cutting undergrowth and woody stems as part of general ground clearance (Photo 9). This is not a typically European tool, so it was presumably designed as an improved version of an existing African tool. The most likely model is the *couteau de culture* of the Congo (§3.3.2) which was probably remodelled in Europe in the nineteenth century and re-exported to Africa. Since it has a 'new' name in most places, it is likely that the category was unfamiliar to most buyers. It has become virtually continent-wide as an implement and is often used to symbolise African culture, somewhat ironically in view of its recent development.

Photo 9. Cutlasses, Burkina Faso



Source: FIDA (1999)

3.3.4 Banana-cutter

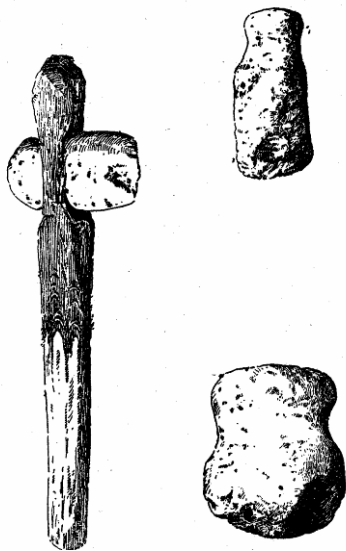
In regions where bananas are a staple, a variant of the knife is used to cut down bunches of bananas (FIDA 1999). This is a curved blade attached to a forked stick. The example illustrated in Photo 10 is from Uganda, but there is no further information on how widespread this implement is.

Photo 10. Banana-cutter, Uganda



Source: FIDA (1999)

Figure 8. Bubi stones axes in the 1920s



Source: Tessmann (1922)

remains slight. Widstrand (1958:88) points out that the axe features in many 'civilising hero' myths, often to the exclusion of other tools. Whether these narratives date from the pre-iron period is unclear, but it points to the early role of axes in chopping away vegetation for farming. Waisted stones axes are found widely across much of Africa and survived into historic times on the island of Fernando Po because of its isolation from the mainland (Tessmann 1922). **Figure 8** shows one of these stone axes; it is quite difficult to imagine they would be effective at cutting back the equatorial forest.

3.4 Axes

3.4.1 Hafted stone axes

Stone axes are a common lithic artefact described in pre-iron age archaeology, but the evidence for their contexts of use

3.4.2 Iron axes

Axes with iron blades occur almost throughout the continent. Widstrand (1958) is a comprehensive survey of axe types, including tools, weapons and ceremonial axes. Most societies recognise a distinction between adzes and axes; and adze has the cutting edge transverse to the handle, while in an axe the blade is parallel with the shaft. Adzes are used principally for woodcarving and are not treated here. Axes are used in many societies as much for warfare as for cutting wood and for this reason they are not usually covered in synthesising sources such as Baumann (1944) and Seignobos (2000). The two main types are the transpierced axe (which Widstrand calls the 'slot-shafted' axe) (Photo 11) and the socketed axe (Photo 12).

Photo 12. Dogon socketed axe



Photo 11. Dogon transpierced axe



Widstrand (1958: Map 2) shows that transpierced axes are found from Senegambia to Zululand with some records on the Nile in the Maghreb. Socketed axes (Map 9.) are more limited and occur from Senegambia across to the Horn of Africa, with a small island of occurrences in Angola, but are otherwise absent from eastern and southern Africa. Photo 13 shows an axe-blade recovered from the site on Akonyete in Southern Cameroun with the same dating and provenance as the socketed hoe (3.2.5) and knife-blade (3.3.1).

Photo 13. Axe blade from Akonyete



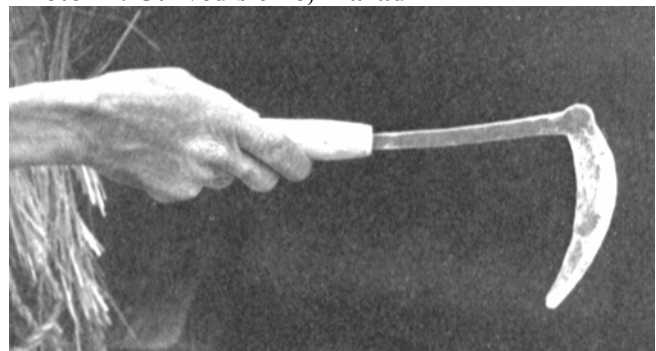
A third axe-form is recorded from NE Africa, where the handle of the axe passes through a ring, either at the other end from the cutting blade or in the middle (when it starts to resemble a pickaxe, morphologically). These axes are only recorded from the East African coast, Uganda, Ethiopia and a strip up the Nile, as well as on Madagascar (Widstrand 1958: Map 11). There is some evidence that even these sub-Saharan Africa occurrences may well be local blacksmiths copying European models. Similar axe-blades have also been imported into other regions of Africa (e.g. Mudindaambi 1976).

3.5 Sickles

3.5.1 Curved sickle

Two types of sickles for harvesting cereals occur across Sahelian Africa, the curved sickle, with a hooked blade in a cylindrical wooden handle and a lateral sickle (§3.5.2). The curved sickle shown in Photo 14 closely resembles small

Photo 14. Curved sickle, Maradi



Source: Raynaut (1984:531)

Mediterranean sickles and there is every reason to believe this is a relatively recent introduction, perhaps from the medieval period (see also Arkell 1937b). A Moroccan parallel can be seen in Stuhlmann (1912:72). Raynaut (1984:530-531) points out that both inserted tang and socketed types of sickle exist in West Africa. In many Nigerian languages, the term is borrowed from the Hausa *lauje* and it seems likely to have been spread southwards by the Hausa people.

3.5.2 Lateral sickle

The lateral sickle, shown in Photo 15, is an iron blade with a leather or wooden holder, attached to the hand by a loop of cord. It allows the harvester to cut off the head of grain with considerable precision. The exact source of this implement is unknown but it is found across Sahelian West Africa.

Photo 15. Lateral sickle, Maradi



Source: Raynaut (1984)

3.6 Spades, shovels, trowels

Compared with the hoe, the spade principle, where the blade is in line with the handle instead of perpendicular to it, is very rare in Africa. Long-handled spades, sometimes with wooden blades are occur across the Sahel and a variety of implements similar to trowels occur in Cameroun and adjacent regions.

3.6.1 The *iler*

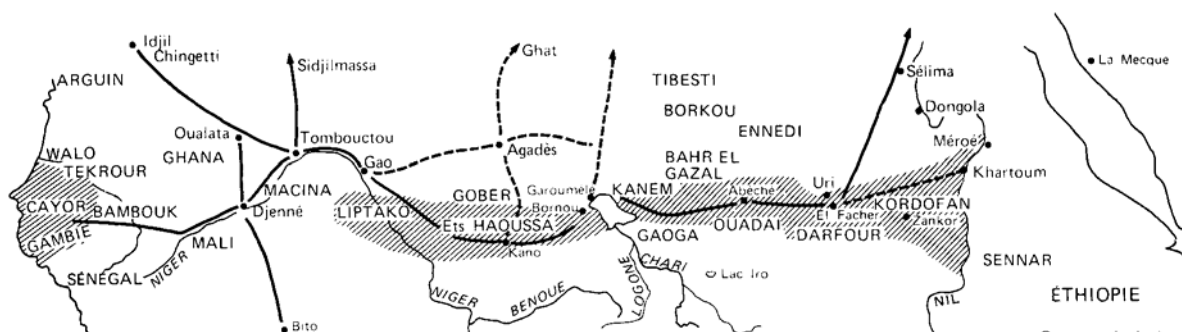
Across the West African Sahel, a long-handled spade is used to move earth, especially in flood-plains (**Photo 16**). Daniel (1931) may have been the first to draw attention to this implement, which he records being used in the area of Sokoto in NW Nigeria. Pelissier (1966: Planche 43) includes a comprehensive series of photographs of the use of the *iler* among the Diola of the Casamance. This is an old North African tool and is also recorded ethnographically from Morocco. Map 3 shows its approximate distribution across Sahelian Africa. There are two discussions in print of this tool, Raynaut (1984) and Wigboldus (2000) both of whom conclude the *iler* is a relatively recent trans-Saharan migrant, although they differ on the date of its transmission. To judge by its geography, it may well have diffused across the Sahara

Photo 16. Using the *kworami* in Sokoto



Source: Daniel (1931)

Map 3. Distribution of the *iler* spade

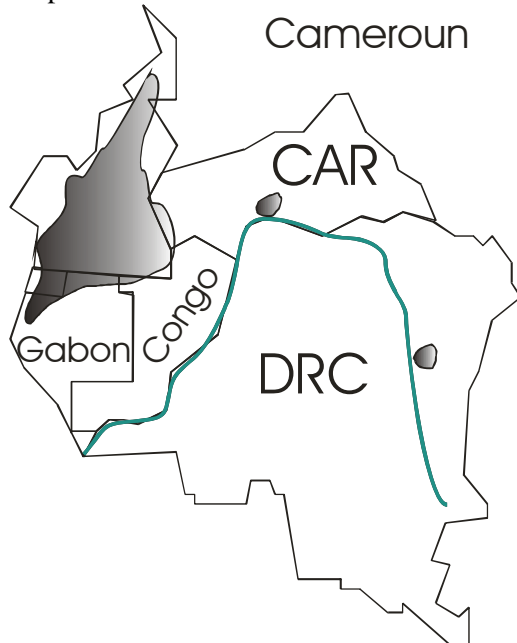


at different times along different routes, so there may be no final solution.

3.6.2 Trowels

The trowel is a rare agricultural implement in Africa, but the literature states that it occurs in a restricted area in Cameroun and adjacent Congo and Gabon. However, it is apparently more widespread as shows a trowel collected among the Igbo in Nigeria. Blade shapes vary, but at least some examples have the classic diamond-shape typical of Europe (Figure 9). Baumann (1944:266-268) was the first to map this

Map 4. Distribution of African trowels



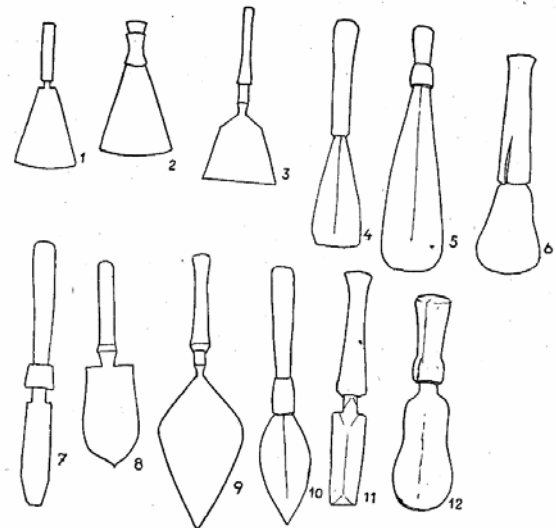
implement and it seems never to have become widespread. Wente-Lukas (1977:92) and Seignobos (2000) show trowels from the Mandara mountains which have a distinctive T-shaped wooden handle and socketed blades rather than the inserted blades illustrated by Baumann. Nonetheless, usage appears to be identical to judge by Seignobos' (2000: Fig. 4) illustration. Map 4 is a composite of the distributions posited by Baumann (1944) and Seignobos (2000).

3.7 Miscellanea

3.7.1 Fruit-hook

An implement of unknown date is the fruit-hook, an angled knife on a long pole, used to cut off stalks and bring down fruits from high trees (**Photo 18**). These are made by the Dogon peoples of Northern Mali who depend on a wide variety of economic trees for their subsistence. Rather more temporary implements are made widely throughout Africa, usually long

Figure 9. African trowel types



Source: Baumann (1944)

Photo 17. Igbo 'trowel'



Source: Author's collection

Photo 18. Dogon fruit-hook



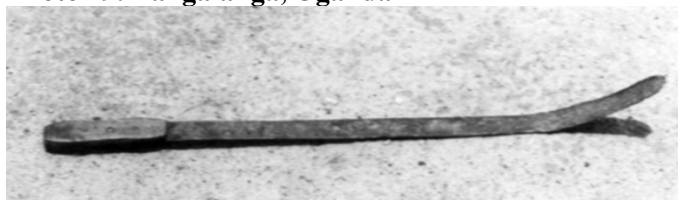
bamboo canes with a bent piece of wire inserted into one end. Rather charmingly, these are known in Nigeria vernacular English as a ‘go-to-hell’, apparently from their resemblance to a bishop’s crozier.

3.7.2 Langalanga, *coupe-coupe*

The langalanga is a simply flat strip of metal, bent at one end, which can be used to slash at rampant grass. It is not a European tool, nor one of any great antiquity in Africa and seems to have developed based on scrap metal in the colonial period in West Africa. Even today, it is not uncommon to see lines of schoolchildren in Nigeria disconsolately advancing across a schoolground, slashing away at the grass. Although it is also known in Ghana, little information is available about its origin or distribution. ‘Langalanga’ was adopted as a pen name by a colonial officer for his memoirs in 1927, so it may be dated to at least this period. Moñino (1984) illustrates a type of langalanga with a cylindrical wooden handle in use among the Gbaya in CAR.

FIDA (1999) pictures a very similar implement from Uganda, so it is probably widespread across Africa.

Photo 19. Langalanga, Uganda



Source: FIDA (1999)

3.7.3 Yam extractor

Bahuchet (2000) draws attention to a quite idiosyncratic tool, a *tarière*, used by the Aka and Baka pygmies of the Central African rainforest. It is a stick with the far end split into five and the free strips bent outwards to form a sort of cradle. It is used for extracting a particular species of yam, *Dioscorea semperflorens*. Once the ground has been pierced by a digging stick, the yam extractor is used to dig down and pull out the yam tuber (Figure 10). The Aka call it *dísó* and the Baka *bòndùngà*. Seignobos (2000) also mentions a similar tool among the Vute of the Grassfields, so this implement may not be confined to the pygmies.

Figure 10. Yam extractor, Aka pygmies



Source: Bahuchet (2000)

3.7.4 Palm-wine tapping knife

Photo 20 shows a typical palm-wine tapping knife used by the Igbo in Nigeria to pierce the trunk of the palm-tree in order to drain off the sap to make alcoholic drinks. Such knives occur all along the forest zone of West Africa, although their exact distribution seems not to have been mapped.

Photo 20. Palm-wine tapping knife, Igbo



Source: Author’s collection

3.7.5 Pitchfork

Raynaut (1984: 528) illustrates a pitchfork from the Maradi area of Niger, known in Hausa as *mashaarii*. It is made from a naturally forked wooden stick and is used to lift straw. Baumann (1944:298) shows a similar implement from the Oromo in Southern Ethiopia. It seems likely these are local adoptions from North Africa, as no other examples seem to be recorded from sub-Saharan Africa.

Photo 21. Pitchfork, Maradi

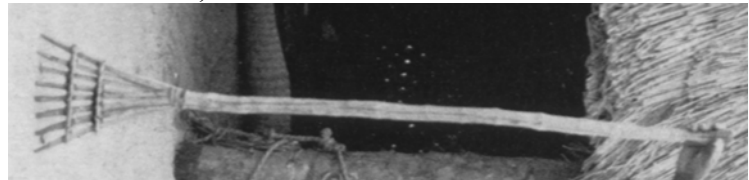


Source: Raynaut (1984)

3.7.6 Rake

Raynaut (1984: 529) illustrates a rake from the Maradi area of Niger, known in Hausa as *mayayaa* (Photo 22). It is made from a stick with one end split into tongues which are kept spread out by transverse sticks. This may be adopted from North Africa, although Baumann (1944: 298) illustrates a rake from the Sandawe in Tanzania. Copies of modern rakes of European design (i.e. where the handle ends in a transverse bar along which are fixed a series of lateral strakes perpendicular to it) are now made by West African blacksmiths, but this is a recent development.

Photo 22. Rake, Maradi



Source: Raynaut (1984)

4. The road not taken: tools that failed to spread

4.1 Mediterranean tools

Although there is case for the diffusion of some implements across the Sahara, to a large extent sub-Saharan Africa seems to have followed its own path with respect to agricultural tools. It seems worth noting that apart from the plough (§4.2) there are other North African implements that failed to cross the desert. One of these is the pick-axe, widely used around the Mediterranean for breaking rocks and hard earth, but not recorded south of the desert. The rake and the pitchfork, although with a couple of records (§3.7. & §3.7.4) are probably very recent introductions.

4.2 Ploughs

The most notable example of an implement that failed to spread is the plough; ploughs were unknown in sub-Saharan Africa until introduced by missionaries and the colonial authorities in the 1920s. Ethiopia, as so often, seems to have quite a different history from elsewhere. The plough characteristic of Ethiopia, an ard which fractures and disturbs the soil, seems to have been introduced following the migrations of Ethiosemitic speakers across from Yemen. The Amharic term for plough, *maräša*, ማረሻ, has been borrowed into all the main languages of Ethiopia. Even where this term is not used, the local terms turn out to be constructs ('hoe of cow' etc.) which indicate the recent adoption of the plough. Barnett (1999:24) canvasses ideas of introductions from Arabia or Egypt 3-4000 BP, but the linguistic evidence suggests a more recent date. Neither the design of the Ethiopian plough nor its name points to external origin and it is quite likely that it was constructed locally through stimulus diffusion, i.e. a plough seen elsewhere and was redesigned for local conditions. All forms of animal traction have an ancient history in North Africa and in theory at

least, the plough could have been transmitted across the Sahara with the caravan trade along with food-crops and irrigation techniques (Bulliet 1975). Indeed, as Bernus (1981:286) points out, simple camel-drawn ground-preparation tools (*ashek n egdri*) are used in Saharan oases by the Tamasheq. This begs the interesting question as to why the introduction of the plough in the 1920s was so successful, if it had previously been rejected. The answer may lie in the challenge from the trypanosomoses. Until recently, cattle could survive the challenge of tsetse in sub-Saharan Africa through careful management by herders; subjected to work stress and kept in a single location they often died. Once better nutrition and simple trypanocides were introduced, traction cattle could stay alive and were thus an economic option.

5. Conclusions

African agricultural tools remain remarkably little studied by archaeologists and ethnographers and much of what *has* been published relates to Francophone countries, giving a skewed image of the continent as a whole. Yet the introduction of iron tools introduced a revolution in the agriculture of the continent and the need to produce iron by smelting a major economic transformation. This paper has not covered the relationship between specific tool categories and agriculture practices, but there is no doubt that without iron, the exploitation of the equatorial forest for subsistence other than by foraging was virtually impossible. The study of tools is also a matter of urgency, as many unusual local types are disappearing and being replaced either with factory-made implements or with more standard tools used across a wide area.

Table 4 represents a synthesis of the information presented in this paper. Almost all the information is uncertain and likely to be amended by the availability of further data.

Table 4. Synthesis: African agricultural implements

Tool	Where occurring	When introduced
Digging stick	Presumably originally through Africa but now typically in regions with light, sandy soils	Very ancient
Planter	Sahelian Africa	Coincident with the beginnings of agriculture
Arrowhead	Sahelian West Africa, desert margins	Probably medieval
digging stick		
Wooden hoe	Senegambia to Southern Ethiopia	Probably <i>more</i> recent than iron hoes
Bound hoe	Probably occur all over Africa as they represent a transition to fixed hoes	Different dates in different regions
Transpierced hoe	Throughout sub-Saharan Africa	Probably coincides with introduction of iron-smelting technology ca. 2500 BP
Gripped hoes	Apparently confined to a small region of northern Cameroun and adjacent Chad	Unknown
Socketed hoes	Throughout sub-Saharan Africa	Because these require more iron than other hoe types, they may well be more recent than, for example, the transpierced hoe
Knife	Throughout sub-Saharan Africa	Probably very ancient, as iron knives are likely to have been model on cane precursors
<i>Couteau de culture</i>	Cameroun, Gabon, Congo, DRC	Probably dates back to the early spread of smelting in the Bantu zone
Cutlass	Throughout sub-Saharan Africa	Nineteenth century?
Banana-cutter	Uganda	Unknown
Hafted stone axe	Originally widespread in sub-Saharan Africa but surviving into historic times only in Fernando Po	Very ancient

Tool	Where occurring	When introduced
Socketed axe	Throughout sub-Saharan Africa	Probably subsequent to the transpierced axe
Transpierced axe	Throughout sub-Saharan Africa	Probably coincides with introduction of iron-smelting technology ca. 2500 BP
Curved sickle	Sahelian Africa	Probably medieval
Lateral sickle	Sahelian West Africa	Probably medieval
<i>Iler</i>	Sahelian Africa although absent from Mali	Probably medieval
Trowel	Nigeria, Cameroun, Gabon, Congo, DRC	Probably dates back to the early spread of smelting in the Bantu zone
Fruit-hook	Dogon Plateau, Mali	Unknown
Langalanga	Widespread in sub-Saharan Africa	Probably introduced in the colonial era
Yam extractor	Cameroun, DRC	Probably very ancient
Palm-wine knife	Forest zone of West Africa	Unknown
Pitchfork	Niger, Ethiopia	Probably medieval
Rake	Niger, Tanzania	Probably medieval, though Tanzania occurrence may be colonial era
Plough	Ethiopia	ca. 3000 BP

Some broad conclusions can be drawn from our present understanding of the data;

- The evidence suggests that African agriculture takes off relatively late, although prior to the introduction of iron. However, iron made it possible to exploit a range of new environments inaccessible with stone tools.
- The diversity of African agricultural implements is probably strongly related to the availability of iron. For much of the period iron tools were expensive and designs intended to save iron.
- Wooden hoes are probably not precursors of iron hoes but subsequent copies
- Hoes with bound and gripped blades do not reflect a single design but the gradual introduction of traded blades to individual societies
- A significant number of new implements seem to have spread across the Sahara in the last thousand years. Hence there is a relative diversity on the southern edge of the desert compared with the continent as a whole.
- The abundant iron now available from scrap has led to a second phase of diversification of tools. However, at the same time, increased long-distance trade has tended to replace highly local tools with common designs.

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